

JORDAN AND HAMBURG LLP  
 122 East 42nd Street,  
 New York, NY 10168  
 Tel: (212) 986-2340 Fax: (212) 953-7733  
 Customer No.: 000028107

Docket No.: F-7329  
 Filing Date: February 21, 2002

**Certificate of Express Mailing Under 37 CFR 1.10**

"Express Mail" label number: EV 021 743 539 US

Date of Deposit: 2/21/2002

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to ASSISTANT COMMISSIONER OF PATENTS, WASHINGTON, DC 20231 having the above "Express Mail" label number on the date of deposit indicated above.

Madeline Gonzalez

(Typed or printed name of person mailing paper or fee)

*Madeline Gonzalez*  
 (Signature of person mailing paper or fee)

THE ASSISTANT COMMISSIONER FOR PATENTS  
 Washington, D. C. 20231

- ☐ ATTN: BOX PATENT APPLICATION  
☐ ATTN: BOX DESIGN PATENT APPLICATION  
☒ ATTN: BOX PCT  
☐ ATTN: BOX PROVISIONAL PATENT APPLICATION  
☒ THIS IS THE 35 U.S.C 371 NATIONAL STAGE OF PCT/EP00/08698 FILED

September 6, 2000

Sir:

Transmitted herewith for filing is the ☒ Utility ☐ Design ☒ nonprovisional ☐ provisional patent application of:

Inventor / Application Identifier: Holger LAUSCH

☐ See Inventor Information Sheet attached

For: **METHOD AND ARRANGEMENT FOR DETECTING AND ANALYZING THE RECEPTION BEHAVIOR OF PEOPLE**

- ☐ This is a new patent application.  
☒ This is the 35 U.S.C. 371 National Stage Application of the above-identified PCT Application.  
☐ This is a provisional patent application.  
☐ This is a: ☐ Continuation Application  
                   ☐ Divisional Application  
                   ☐ Continuation-in-Part Application  
                                   of prior Application Serial No. \_\_\_\_  
☐ Cancel in this application original claims \_\_\_\_ of the prior application before calculating the filing fee.  
☐ Amend the specification by inserting before the first line the sentence:  
     -- This is a ☐ Continuation, ☐ Divisional, ☐ Continuation-in-part, of Application

[ ] Incorporation By Reference. The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

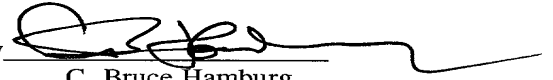
ENCLOSED ARE THE FOLLOWING:		
X	3	Sheets of drawings ([X] formal [ ] informal size A4 ).
X	12	Pages of specification including abstract and claims.
X	15	Total pages.
X	Combined Declaration and Power of Attorney	
	X	Newly executed
		Copy from prior application
		Inventors deleted; see attached statement
	Sequence Listing	
		Computer Readable Copy
		Paper copy
		Statement verifying identity of above copies
X	Return Receipt Postcard	
X	Preliminary Amendment	
	Assignment to:	
		Assignment is of record in prior application Serial No._.
		Assignment Recordation Form Cover Sheet.
		Charge \$40.00 to Deposit Account No. 10-1250 for recording Assignment.
X	Information Disclosure Statement	
X	Information Disclosure Citation	
	English translation	
X	Application Data Sheet	

PRIORITY CLAIMS	
	Applicant hereby claims the benefit of the filing date of the following provisional application(s) under the provision of 35 USC 119.
X	Applicant hereby claims the benefit under the provisions of 35 USC 119 of the filing dates of the following applications as indicated below:  <div style="text-align: center;">Germany Patent Appln. No. 199 43 703.3, filed September 6, 1999, Priority Claimed</div> <div style="text-align: center;">of which certified copies thereof</div>
	<input type="checkbox"/> will follow
	<input type="checkbox"/> are enclosed
	X have been filed in the International Bureau
	<input type="checkbox"/> were filed in prior application:

CLAIMS FILED AND FILING FEE CALCULATION					
ITEM	—			Rate	Applied Fee
[ ] Base Fee - Non PCT	—			\$740	
[ ] Base Fee - PCT IPEA-US	—			\$710	
[ ] Base Fee - PCT ISA-US	—			\$740	
[ ] Base Fee - PCT not ISA or IPEA	—			\$1,040	
[X] Base Fee - PCT with EPO or JPO Search Report	—			\$890	\$890
[ ] Base Fee - Design	—			\$330	
[ ] Base Fee - Provisional	—			\$160	
Claim Fees	Number Filed	Base Number	Number Extra over Base	—	
Total Claims	14	20	0	\$18	\$0
Independent Claims	1	3	0	\$84	\$0
Multiple Dependent Claim Fee	—			\$280	\$0
[X] Small Entity Status is Asserted	—				(\$445)
[ ] Foreign Language Filing Fee	—			\$130	\$0
TOTAL FILING FEE					\$445

- [X] Please charge Deposit Account No. 10-1250 in the amount of the above TOTAL FILING FEE. A duplicate copy of this sheet is attached.
- [X] Please charge to Deposit Account No. 10-1250 any further fees due for filing or during prosecution of this application under: 37 CFR 1.16; 37 CFR 1.17; and 37 CFR 1.492.

JORDAN AND HAMBURG LLP

By   
C. Bruce Hamburg  
Reg. No. 22,389  
Attorney for Applicant

F-7329

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant : Holger LAUSCH

Serial No. : U.S. National Stage of PCT/EP00/08698  
filed September 6, 2000

Filed : Concurrently herewith

For : METHOD AND ARRANGEMENT FOR  
DETECTING AND ANALYZING THE  
RECEPTION BEHAVIOR OF PEOPLE

Group Art Unit : (Not yet known)

Examiner : (Not yet known)

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT**

Sir:

Preliminary to examination, please amend this application as follows:

**IN THE CLAIMS:**

Amend claims 1-10 as follows, the amendments being shown by brackets  
and underlining in the Appendix hereto.

1. (Amended) A method for detecting and analyzing behavior of persons in  
at least one room in dependence on visual, audiovisual and/or auditory messages

10069907-02102

intended to influence actions and/or path of movement of said persons, comprising detecting time-dependently by at least one predetermined frequency the position coordinates of each person, the body coordinates of each person, turns and rotations of each person's body and/or parts thereof as well as each person's posture and/or attitude of each person's extremities from the persons's entry into the room up to the person's exit from the room.

2. (Amended) Method as claimed in claim 1, wherein the body coordinates comprise both concentration point coordinates of a projection of a person and of single parts of the body of a person as well as the outline coordinates of the person.
3. (Amended) Method as claimed in claim 1 for detecting and analyzing behavior of persons in a plurality of adjacent rooms, wherein at least one identification value and respective coordinates are associated with a person, said identification value and respective coordinates being used for continuing to monitor said person when said person moves from one room to a room adjacent thereto.
4. (Amended) Apparatus for detecting and analyzing the behavior of persons in at least one room in dependence on visual, audiovisual and/or auditory messages intended to influence actions and/or path of movement of said person in said at least one room, comprising means for detecting time-dependently by at least one

predetermined frequency the position coordinates of each person, the body coordinates of each person, turns and rotations of each person's body and/or parts thereof as well as each person's posture and/or attitude of each person's extremities from the person's entry into up to the person's exit from the room, the detecting means comprising at least one sensor module in an upper position of each room, said sensor module being adapted for detecting the electromagnetic radiation from each said person present in said room, and at least one image processing module and at least one database module, said sensor, image processing and database modules being operatively connected together.

5. (Amended) Apparatus as claimed in claim 4, comprising a plurality of said sensor modules and said image processing modules.

6. (Amended) Apparatus as claimed in claim 5, further comprising a central evaluation and control module and wherein a plurality of said database modules are operatively connected to said central evaluation and control module.

7. (Amended) Apparatus as claimed in claim 4, wherein said at least one sensor module comprises first and second sensor modules, said second sensor module being associated with said first sensor module and being adapted for

20122201069907.022102

F-7329

transmitting electromagnetic or thermal radiation for spectroscopic or thermal evaluation thereof.

8. (Amended) Apparatus as claimed in claim 7, wherein said first sensor module is a CCD-camera.

9. (Amended) Apparatus as claimed in claim 4, wherein the upper portion of each room is a central area of a ceiling of the room.

10. (Amended) Apparatus as claimed in claim 4, wherein said at least one room comprises a plurality of contiguous rooms including areas characterized as one of said contiguous rooms overlapping areas characterized as another of said contiguous rooms.

Add the following claims:

-- 11. Method according to claim 1, wherein said at least one predetermined frequency is greater than 1 Hz.

12. Method according to claim 11, wherein said at least one predetermined frequency is in a range of 7 to 30 Hz.



F-7329

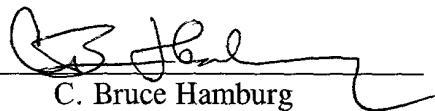
13. Apparatus according to claim 4, wherein the frequency of the means for detecting is at least 1 Hz.

14. Apparatus according to claim 13, wherein the frequency of the means for detecting is in a range of 7 to 30 Hz. --

### REMARKS

The original claims are a literal English translation of the German language claims of the PCT application. Those claims were prepared for examination by the EPO and, accordingly, as to format and other formulation, are not suitable for U.S. practice. The purpose of the present amendment is to provide amended and additional claims more suitable for U.S. practice.

Respectfully submitted,  
Jordan and Hamburg LLP

By   
C. Bruce Hamburg  
Reg. No. 22,389  
Attorney for Applicants

122 East 42nd Street  
New York, New York 10168  
(212) 986-2340  
CBH/pb

20120220 10:55:00

APPENDIX I

AMENDED CLAIMS WITH AMENDMENTS INDICATED THEREIN  
BY BRACKETS AND UNDERLINING

1. (Amended) A method for detecting and analyzing [the reception] behavior of persons in at least one [reception] room in dependence on visual, audiovisual and/or auditory messages [, intended to influence actions and/or path of movement [guiding of flows] of said persons, [customers whereby the position coordinates of each person are determined] comprising detecting time-dependently by [a selectable] at least one predetermined frequency [, which preferably is greater unity, characterized in that, in addition to] the position coordinates of each person, the body coordinates of each person, [her/his] turns and rotations of [her/his] each person's body [or/and of] and/or parts [of the body] thereof as well as [her/his] each person's posture [or/and] and/or [the posture] attitude of [her/his] each person's extremities [are detected] from [her/his] the persons's entry into the [reception] room up to [her/his] the person's exit from the [reception] room.

2. (Amended) Method as claimed in claim 1, [characterized in that] wherein the body coordinates comprise both [, the] concentration point coordinates of a projection of a person and of single parts of the body of a person as well as the outline coordinates of the person.

20110629 10:59:07

3. (Amended) Method as claimed in claim 1 for detecting and analyzing behavior of persons in a plurality of adjacent rooms, [characterized in that] wherein at least one identification value and respective coordinates are associated [to] with a person, [which are] said identification value and respective coordinates being used for [taking over] continuing to monitor said person when [moving] said person moves from one [reception] room to [a neighboring one] a room adjacent thereto.

4. (Amended) [Arrangement for carrying out said method as claimed in at least one of the claims 1 through 3, characterized in that] Apparatus for detecting and analyzing the behavior of persons in at least one room in dependence on visual, audiovisual and/or auditory messages intended to influence actions and/or path of movement of said person in said at least one room, comprising means for detecting time-dependently by at least one predetermined frequency the position coordinates of each person, the body coordinates of each person, turns and rotations of each person's body and/or parts thereof as well as each person's posture and/or attitude of each person's extremities from the person's entry into up to the person's exit from the room, the detecting means comprising at least one sensor module [is provided] in [the] an upper [range] position of each [reception] room, said sensor module being adapted for detecting the electromagnetic radiation from [the] each said person present in said [reception] room, and [in that the sensor module is followed by an]

F-7329

at least one image processing module and [a] at least one database module, said sensor, image processing and database modules being operatively connected together.

5. (Amended) [An arrangement] Apparatus as claimed in claim 4, [characterized in that] comprising a plurality of said sensor modules and said image processing modules [are pre-connected to said database module].

6. (Amended) [An arrangement] Apparatus as claimed in claim 5, [characterized in that at least two database modules are connected to] further comprising a central evaluation and control module and wherein a plurality of said database modules are operatively connected to said central evaluation and control module.

7. (Amended) [An arrangement] Apparatus as claimed in claim 4, [characterized in that a further] wherein said at least one sensor module [is associated to said one] comprises first and second sensor [module] modules, said [further] second sensor module [is] being associated with said first sensor module and being adapted for [feeding the] transmitting electromagnetic or thermal radiation [to a] for spectroscopic or thermal evaluation thereof.

10069907.022102

F-7329

8. (Amended) [An arrangement] Apparatus as claimed in claim 7,  
[characterized in that] wherein said [one] first sensor module is a CCD-camera.

9. (Amended) [An arrangement] Apparatus as claimed in claim 4,  
[characterized in that the sensor module] wherein the upper portion of each room is  
[centrally arranged at the] a central area of a ceiling of the [reception] room.

10. (Amended) [An arrangement] Apparatus as claimed in claim 4,  
[characterized in that adjacent reception] wherein said at least one room comprises  
a plurality of contiguous rooms including areas characterized as one of said  
contiguous rooms overlapping areas characterized as another of said contiguous  
rooms [are overlapping each other].

## METHOD AND ARRANGEMENT FOR DETECTING AND ANALYZING THE RECEPTION BEHAVIOR OF PEOPLE

### BACKGROUND OF THE INVENTION

- 5 The invention relates to a method and arrangement for detecting and analyzing the reception behavior of people in at least one reception room in dependence on messages transmitted visually, audiovisually and/or auditorily, according to the type of claims. In particular, the invention relates to the automatically and objectively verifiable detection of the
- 10 advertising effectiveness of messages, activities and facilities for guiding flows of customers, as well as for detecting the intentional customer behavior in shops, shopping streets, shopping arcades, terminals, railway stations, petrol stations etc.
- 15 For detecting the effectiveness of advertising measures for products and services, sensors such as infrared sensors, CCDs and the like are used in a suitable arrangement in order to count persons on entering an advertised range and on departing from the same, as well as to detect more or less statistically how long they stay in the advertised range. If necessary, also
- 20 the buying behavior of the persons in dependence on an advertising campaign, which is on or not, can be indirectly detected by detecting the actually bought goods via a registration by the electronic cash at the exit of an advertising range and a purchasing area, respectively. The results obtained can be evaluated in a computer in order to draw certain
- 25 conclusions from the buying behavior of the recipients in dependence on advertising. This method, however, is not very precise in its presently practiced form since, for example, the mere presence in an advertised range does not tell anything on the attention paid to the advertising.
- 30 A precise method for detecting the perception of the visual or audiovisual messages is the so-called "eye-tracking", which detects and registers the eye movements of one or a few person/s by means of suitable sensors provided at suitable locations. The position of the eye and of the pupil signalizes the perception of and the attention to the advertising instruments by the respective recipient. The relation between the
- 35 perception of and the attention to, respectively, the advertising and the buying behavior of the recipient can be found out by a long analyzing

10069907.022102

chain in combination with interviews. This method is technologically very expensive when one considers that, inter alia, a plurality of recipients is staying in an advertising and shopping range, whereby the movements of the eyes of each recipient have to be tracked.

- 5 Furthermore, there are various methods known for selecting persons in and from video images, as well as for detecting head and shoulder formations and for detecting and storing faces. They are used for counting and identifying as well as for verifying the presence of persons. Thereby head or shoulders, among others, are generally identified and body models are associated thereto. These modeled bodies and the body coordinates resulting therefrom are, to the largest extent, virtual ones and they are not suitable for a real attention analysis and communication analysis.

## 15 SUMMARY OF THE INVENTION

- It is an object of the present invention to provide a precise method, which is of low expenditures, for detecting, analyzing, and evaluating the movements of persons to find out the advertising efficiency of messages, actions and customer flow guiding, and an arrangement for carrying out the same.

According to the invention, the object is realized by the features of the first and the fourth generic claim, which are advantageously embodied by the features of the dependent claims.

- 25 The invention is characterized in that a definite room is repeatedly detected in its entirety and its details by aid of at least one passive or active sensor at a comparatively high frequency. The detection can be combined with a counting of the persons and/or with an identification of the same. The detection frequency shall be greater unity, it will advantageously be 7 through 30 Hz. The sensor/s can be a CCD-camera (passive) or a laser or other sensors emitting and detecting, respectively, electromagnetic or acoustic waves and thermal radiation, respectively, (active and passive). It/they can be located at the ceiling or at the sidewalls in the upper range of the defined room. When an
- 30 electromagnetic or acoustic or thermal transmitter is used, then the contents of the room is scanned in a rapid sequence and in this way the
- 35

profile across the ground plan of the room is actively generated including the objects and subjects, respectively, which are present in the room whereas, when using a CCD-camera the contents of the room is imaged on a CCD-matrix which itself is passive as concerns the imaging process.

- 5 Anyhow, not only all changes in the room can be registered and the tracks of the persons and the objects moving in the room from their entry into the room up to their exit therefrom, but also the turns of the body and of the head of a respective person and the intentional turns, the changes in their posture and the posture of their extremities, respectively, can be time
- 10 dependently detected, so can the speed and the staying times of the individual objects and subjects. Non-moving objects will also be registered, but they will be eliminated from the further data processing or rather will not be considered thereby. The contents of the room can be detected by a single-image method or by a two-image method
- 15 (stereoscopically). Furthermore, it will be possible to evaluate not only black-and-white images but also colored images. Furthermore it is possible to, for example, spectroscopically evaluate not only optically produced images and mirrored images, respectively, but also such having been generated by radio or thermal radiation. In this way it is also
- 20 possible to detect objects and subjects by their size, gender and age provided that they are in the defined room.

- According to the invention preferably means and methods (algorithm) of the image processing are used for detecting and identifying objects and
- 25 subjects being present, respectively, moving in the defined room. Concentration points are deducted from gray values and chromatical values, respectively, or from characterizing, preferably circumscribing, polygons, including triangles. The moving behavior of persons and objects will be deducted from the time-dependent position variations of
- 30 said concentration points. Also differential concentration points can be formed for detecting the number, position, direction of movement, patterns of movement, speeds, staying times, body postures and body turns of the persons, as well as their lines of sight. Such differential concentration points can be captured in a Cartesian spatial coordinate
- 35 system or by vectors and will be processed under inclusion of prominent



points or lines of the body, of the extremities of the same, of shoulders and/or the head of persons.

In contrast to the known methods, the invention method permits a higher counting precision since the counting is carried out in the room and not  
 5 along a barrier (line, plane). A further differentiation of the persons captured will be possible by the spectroscopic and/or thermal analysis of the radiation and waves, respectively, reflected at said persons.

An arrangement for detecting number and movements, features and  
 10 coordinates of objects and subjects in dependence on the offered messages comprises in principle one or a plurality of sensor/s (sensor modules) or camera/s (camera modules) that is/are arranged at the ceiling and/or at the sidewalls, in particular in the upper range of a defined room near the ceiling. It further comprises image processing units downstream  
 15 of said sensors/cameras, whereby said image processing units comprise frame grabbers, socket interfaces, Ethernet interfaces and other remote data transmission interfaces, respectively, and a database module (with socket interface and Ethernet interface, respectively). The individual database modules can be connected to a central evaluation and/or  
 20 instruction module via remote data transmission, whereby said central evaluation and/or instruction module forms the results from the signals provided by the sensors and is capable of influencing and controlling the messages, actions, and customer guiding systems offered in the defined rooms. Each sensor module and camera module, respectively, is followed  
 25 by a sensor signal module and an image processing module, respectively, which captures each object or subject entering the defined room and identifies the same as a such one and differentiates the same, where appropriate. Due to the repeated detection or exposure of the room and its contents, they detect in the manner as described hereinbefore the track of  
 30 the object/subject, its movements in and through the room up to exiting the room, as well as its specific features obtained in this way, and they feed the results achieved in this way to the evaluating database module. Thereby one database module can belong to a plurality of sensor modules and image processing modules.

35 In interaction between the sensorinformation processing and the image processing, respectively, and the statistically evaluating database, the

sensor module and the image processing module, respectively, is capable of constantly generating a plurality of data. The analysis of said data in the database module delivers, optionally and simultaneously, respectively, information on the customer flow and the recipient behavior up to the individual customer, whereby these data can be quantified and qualified. If appropriate and on request of the image projection for the advertising display, the sensor module and the image processing module, respectively, can be re-started, interrogated and/or the information of the same detected with each new advertising spot. In the first and the second case described hereinbefore, the time-related and spot-related respectively contents-related analysis of the recipient behavior is possible. In the second case mentioned hereinbefore, only a spot-related analysis of the recipient behavior can be carried out as a whole. Provided that the spot can be subdivided into intervals, again a time-related and sequence-related analysis is possible, which permits conclusions as concerns the contents of the spots and their structure. When, however, the spot analysis is subdivided into intervals, then it is possible to optimize the contents of the spots and the structure of the spots because of the effectiveness and attention, respectively, which the individual sequences of the advertising messages have achieved. Due to the high image analyzing frequency, an interior decomposition of the spots is possible. Since, for example, with a spot lasting for 15 second at a scanning frequency of 7.5 Hz, more than 100 images are available for the analysis, whereby said images can be decomposed in a plurality of spot intervals, for example, into five reasonable spot intervals, the advertising effectiveness of the individual scenes can be very well and exactly detected therefrom.

#### DETAILED DESCRIPTION OF THE INVENTION

In the following, the invention will be explained in more detail by virtue of the schematical drawings. There is shown in:

Fig. 1 a passage with three defined rooms,

Fig. 2 the effect of the central perspective of the camera on the detected room,

Fig. 3 the image of a reception room on a CCD-matrix of a camera,

Fig. 4 the principle layout of the arrangement according to the invention, and

Fig. 5 a combination of a plurality of inventional arrangements with a central unit for evaluation and providing commands.

5

In Fig. 1 different objects and subjects (recipients)  $r$  are represented executing different movements and directions of movements in defined reception rooms  $w_1$  through  $w_3$  of a passage  $P$ . The differences in the objects and subjects are exemplified by their differentiated reflection behavior which, in turn, is due to size, clothing, body form, age, gender, persons and matter taken along by them, etc. which are here summarized under the term of characteristic or specific features. A display  $d$  is arranged at a sidewall  $s$  of the reception room  $w_2$ . A camera module  $c_1$  respectively  $c_2$  respectively  $c_3$  is associated to each reception room  $w_1$  through  $w_3$ . In accordance with a preselected time schedule, said camera module detects the contents of its reception room and feeds it into a not shown evaluation unit. In this way it is possible to detect the persons as recipients  $r$  by number and differentiation, their movements, turns of the body, movements of head and arms, their stops, and to conclude therefrom the attention they pay to the advertising messages on the display. By the overlapping ranges  $\bar{u}_i$ , the passing over of the persons identified by coordinates and characteristic features to a following evaluation unit (not shown in Fig. 1), which is succeeding the camera module  $c_i$ , will be possible (range overlapping tracking), said evaluation unit will be described in the following.

Fig. 2 again shows a reception room  $w$  covered by a sensor module  $c$ , and a display  $d$  arranged at a sidewall  $s$  of said reception room  $w$ . The sensor  $c$  is coupled to a bio-sensor  $c_b$  which also can be an integral component of the sensor  $c$  and which evaluates spectroscopically or radiologically the radiation features differentially reflected at the recipient  $r$ . In said reception room  $w$  there are several recipients  $r$  that move into different directions respectively, stop and stay at definite places. A space circumscribed by the dotted line  $l$  makes clear that only the recipients (objects and subjects, respectively)  $r$  in this space are completely captured. Hence, the ground plans of the mutually adjacent reception

rooms  $w_i$  have to overlap due to the central perspective of the optical imaging and to the end that the identified persons have to be taken over, so that all the recipients, with respect to their movements and specific features, can be completely detected up to a height of about 2 m.

5

In Fig. 3 there is shown a CCD-matrix  $m$  of a sensor module  $c$  with a sufficient resolution. On said sensor module  $c$  both, a non-displaceable sidewall  $s$ , provided with a display  $d$ , is represented and recipients  $r$  as pixel blots  $a_i$ . The pixel blots are provided as gray values conditioned by the respective persons, environment, and movement, whereby the recipients  $r$  move on track  $b_i$ . Thereby a plurality of exposures are superimposed, which are taken at a frequency of, for example, 25 Hz and from which, for example, every fourth and second, respectively, is to be used for evaluation. It can clearly be seen that the recipient  $r$  corresponding to the pixel blot  $a_1$  has moved with a greater speed than the recipients  $r_i$  represented by the pixel blots  $a_2, a_3, a_4$ , from these only the recipient represented by the pixel blot  $a_3$  has turned to and faces the display. Furthermore, it can be seen that the recipients represented by the pixel blots  $a_2, a_3, a_4$  have moved with very differing speeds at different times, whereby the recipient represented by the pixel blot  $a_3$  indicates his/her being interested in the displayed message in that he/she remarkably reduces the speed down to a stop. The recipient represented by the pixel blot  $a_5$  and moving on the track  $b_5$ , only tangentially passes the defined and imaged room.

25

In Fig. 4 similar to Fig. 1 three sensor modules  $c_1, c_2, c_3$  are represented followed by three image processing modules  $p_i$  and a common database module  $n$ . The image processing modules  $p_i$  constantly generate a plurality of data, by the time dependent analyses of which in the database module  $n$  the number and behavior of the customers is achieved time-dependently. Instead of being arranged in spaced apart relation the sensor modules  $c_i$  and the image processing modules  $p_i$  can be combined into a unit.

Thus, the time-dependent analysis of the movements of persons and the specific features of persons will be combined with the messages or actions offered time-dependently visually, audiovisually and auditorily,

35

respectively. In this way the spot-related behavior and the action related behavior, respectively, of individual recipient can be analyzed as well as the flow of customers. The images generated in the sensor modules  $c_i$  will be processed in the image processing modules  $p_i$ . Thereby the specific optical features (gray values or color values etc.) are detected for each person just as the concentration point coordinates of the body or of parts of the body (extremities, head, nose) and the coordinates of circumscribing polygons. An identification number is associated to each person detected in such a way. Furthermore, the speeds and the vectors of direction of the movements of persons will be detected in the image processing modules  $p_i$  just as their mutual distances and their distance to the site of presentation.

The data detected in this manner are fed into the database module  $n$  which therefrom computes the movement behavior of the individual persons up to the stay time, it also determines a mean velocity in defined action rooms or reception rooms, and the speed of the individual persons is related to the mean velocity. Thus, the database module  $n$  can detect direct and indirect criteria of attention, it further can evaluate them as to their importance and can form mean values. Direct criteria of attention are original ones, for example, coordinates, indirect criteria are deducted ones such as speed.

Fig. 5 shows four module units  $g_1, g_2, g_3, g_4$ , which are differently equipped with camera processing modules and image processing modules. A respective database module  $n_1, n_2, n_3, n_4$  is associated to each module unit  $g_1, g_2, g_3, g_4$ , and all the database modules are connected to a central evaluation module and, if necessary, control module  $z$ , into which they feed their data and by which they are controlled, if required, spot-dependently. By virtue of the analyzing data, the control module  $z$  is capable of optimizing the projection mode of the spots as concerns their sequence, position and frequency.

All features disclosed in the specification, in the subsequent claims, and in the drawings are substantial for the invention both, individually and in any combination with one another.

# LIST OF REFERENCE NUMERALS

	$a_i$	pixel blot/s
	$b_i$	tracks
5	$c, c_i$	camera and sensor modules, respectively,
	$c_b$	bio-sensor
	$d$	display
	$g_i$	module units
	$l$	dotted line/line draw
10	$m$	CCD matrix
	$n, n_i$	database module/s
	$p_i$	image processing modules
	$r$	recipient/s
	$s$	sidewall/s
15	$\bar{u}/\bar{u}_i$	overlapping ranges
	$w, w_i$	reception rooms
	$z$	central evaluation module and control module
	$P$	passage

10065907-002102

**CLAIMS**

- 5 1. A method for detecting and analyzing the reception behavior of persons in at least one reception room in dependence on visual, audiovisual and/or auditory messages, actions and/or guiding of flows of customers, whereby the position coordinates of each person are detected time-dependently by a selectable frequency, which preferably is greater unity, characterized in that, in addition to the position coordinates of each person, the body coordinates of each person, her/his turns and rotations of her/his body or/and of parts of the body as well as her/his posture or/and the posture of her/his extremities are detected from her/his entry into the reception room up to her/his exit from the reception room.
- 10 2. Method as claimed in claim 1, characterized in that the body coordinates comprise both, the concentration point coordinates of a projection of a person and of single parts of the body of a person as well as the outline coordinates of the person.
- 15 3. Method as claimed in claim 1, characterized in that at least one identification value and respective coordinates are associated to a person, which are used for taking over said person when moving from one reception room to a neighboring one.
- 20 4. Arrangement for carrying out said method as claimed in at least one of the claims 1 through 3, characterized in that at least one sensor module is provided in the upper range of each reception room, said sensor module being adapted for detecting the electromagnetic radiation from the person present in said reception room, and in that the sensor module is followed by an image processing module and a database module.
- 25 5. An arrangement as claimed in claim 4, characterized in that a plurality of sensor modules and image processing modules are pre-connected to said database module.
- 30 35

6. An arrangement as claimed in claim 5, characterized in that at least two database modules are connected to a central evaluation and control module.
- 5 7. An arrangement as claimed in claim 4, characterized in that a further sensor module is associated to said one sensor module, said further sensor module is adapted for feeding the electromagnetic or thermal radiation to a spectroscopic or thermal evaluation.
- 10 8. An arrangement as claimed in claim 7, characterized in that said one sensor module is a CCD-camera.
9. An arrangement as claimed in claim 4, characterized in that the sensor module is centrally arranged at the ceiling of the reception room.
- 15 10. An arrangement as claimed in claim 4, characterized in that adjacent reception rooms are overlapping each other.

10069907.022102



## ABSTRACT

5 The invention relates to a method and device for detecting and  
analyzing the reception behavior of people in at least one reception  
room according to visual, audiovisual and/or auditory messages,  
actions and/or to the guiding of flows of customers. The method should  
be able to be realized with a lower degree of complexity than that of  
prior art methods. The invention is characterized in that, from the  
10 moment each person enters the reception room until their departure,  
their location coordinates, body coordinates, turning movements and  
rotating movements of their body and/or of parts of their body, as well  
as the posture of their body and/or the position of their extremities are  
detected with a frequency that is greater than one.

10069907-022102

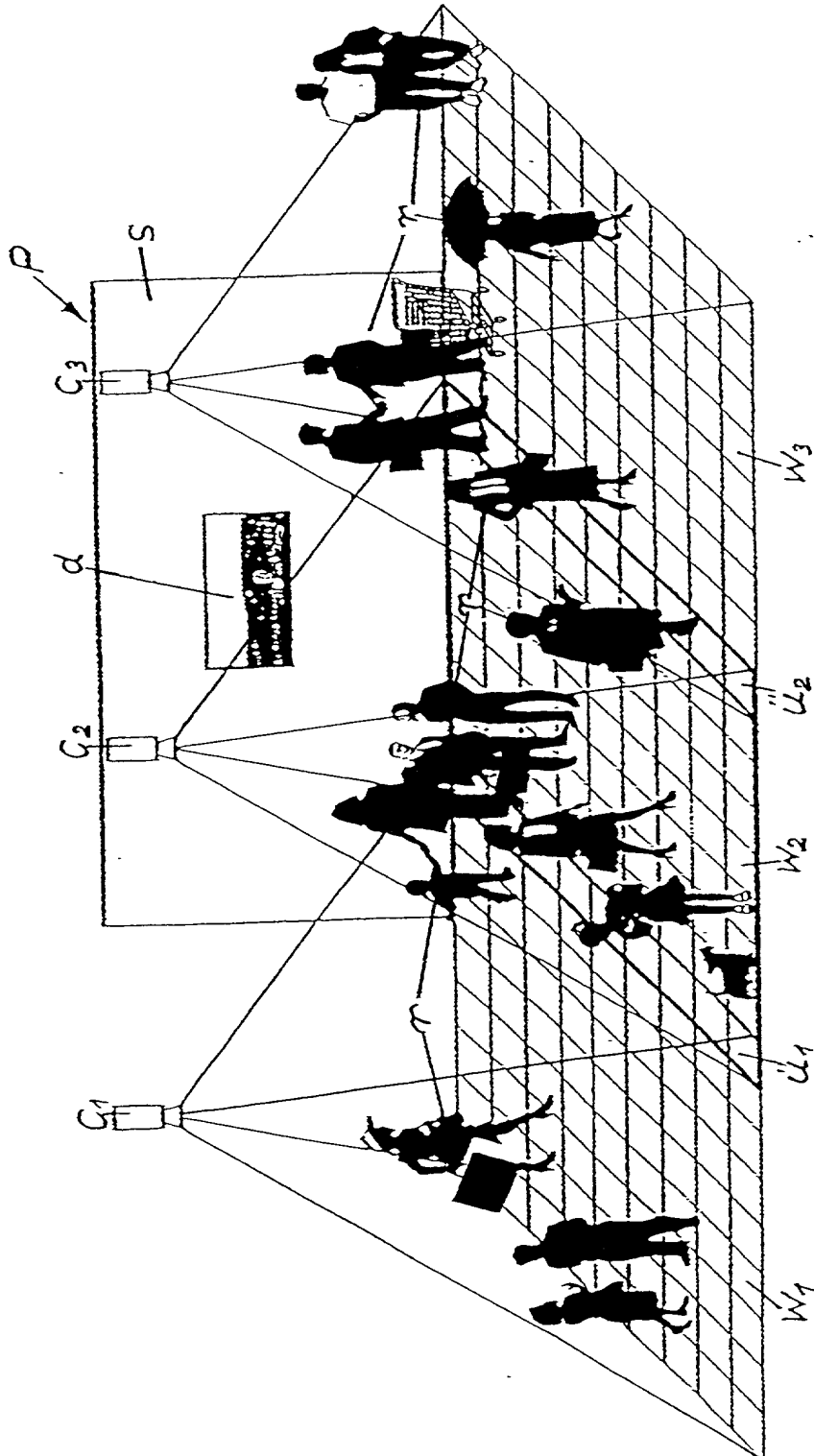


Fig. 1

2/3

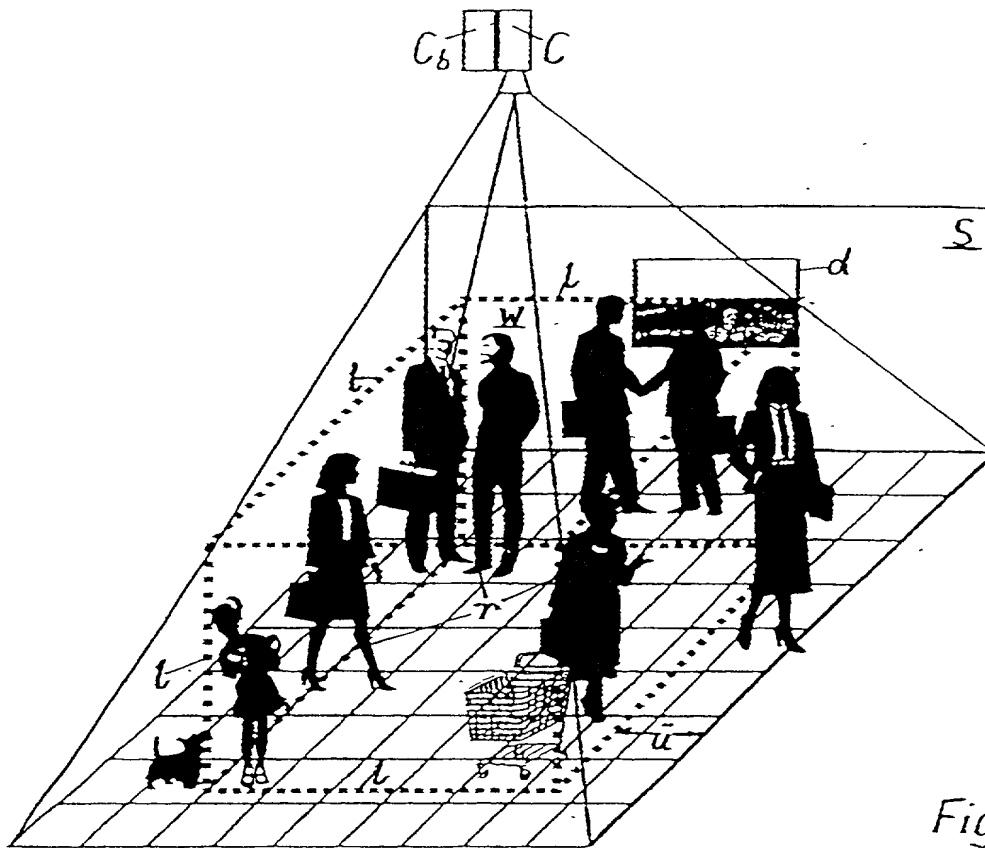


Fig. 2

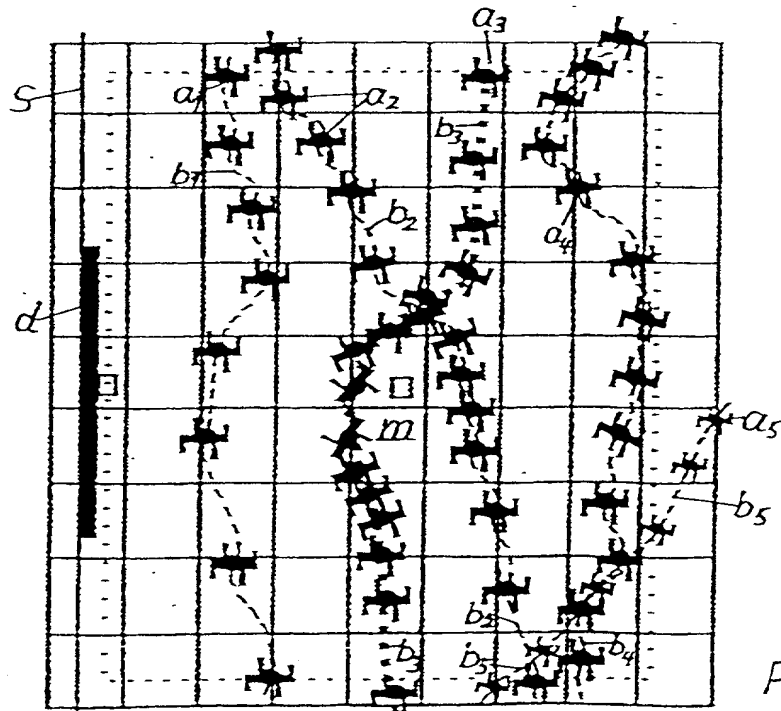
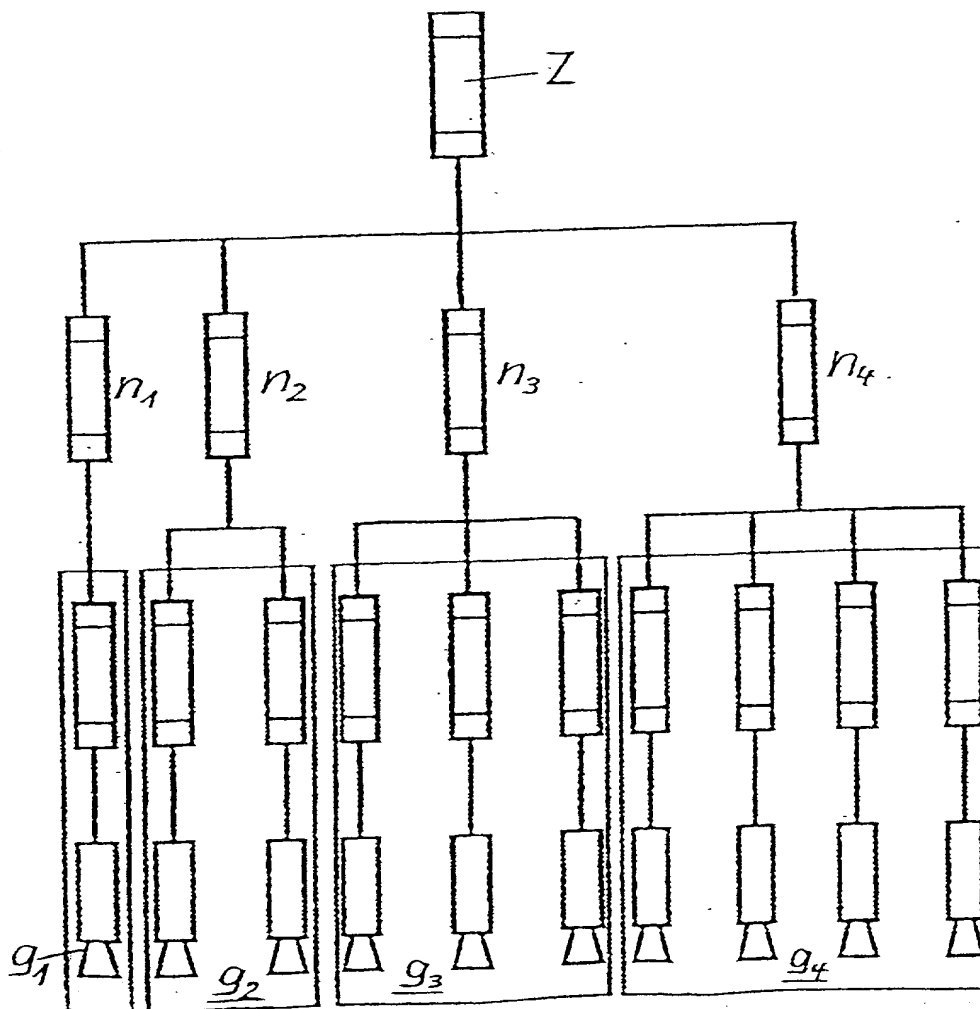
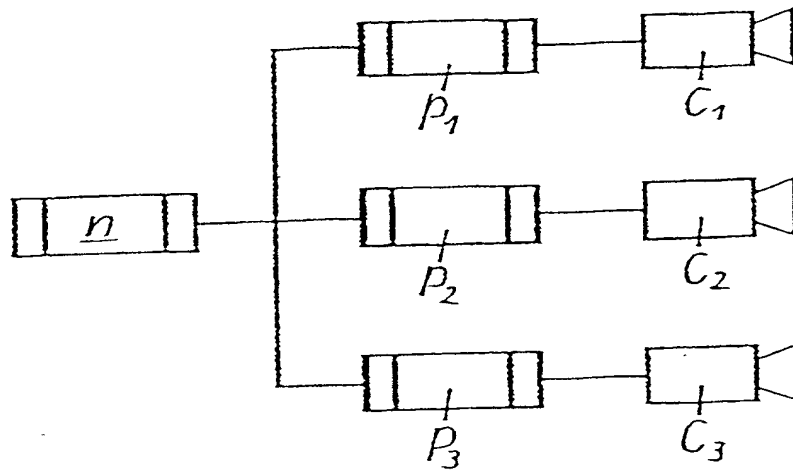


Fig. 3

10069907.022102



COMBINED DECLARATION FOR PATENT APPLICATION AND  
POWER OF ATTORNEY

(Includes Reference to PCT International Applications)

Attorney's Docket Number

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND ARRANGEMENT FOR DETECTING AND  
ANALYZING THE RECEPTION BEHAVIOR OF PEOPLE**

the specification of which (check only one item below):

- ☐ is attached hereto.
- ☐ was filed as United States application  
Serial No. \_\_\_\_\_  
on \_\_\_\_\_  
and was amended  
on \_\_\_\_\_ (if applicable).
- ☒ was filed as PCT international application  
Number **PCT/EP00/08698**  
on **September 06, 2000**  
and was amended under PCT Article 19  
on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:			
Country (if PCT indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 USC 119
DE	199 43 703.3	06.09.1999	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No

COMBINED DECLARATION FOR PATENT APPLICATION AND  
POWER OF ATTORNEY (Continued)  
(Includes Reference to PCT International Applications)

Attorney's Docket Number

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 USC 120.					
U.S. APPLICATIONS			STATUS (Check One)		
U.S. Application Number	U. S. Filing Date		Patented	Pending	Abandoned
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT Application No.	PCT Filing Date	U.S. Serial Numbers Assigned (if any)			

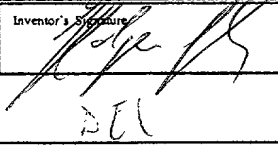
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Frank J. Jordan	Reg. No. <u>20,456</u>	Herbert F. Ruschmann	Reg. No. <u>35,341</u>
C. Bruce Hamburg	Reg. No. <u>22,389</u>	Marvin Turken	Reg. No. <u>18,330</u>
Lainie E. Dolinger	Reg. No. <u>36,123</u>	Alfred D'Andrea	Reg. No. <u>27,752</u>

Send Correspondence To: Jordan and Hamburg  
122 East 42nd Street  
New York, New York 10168

Direct Telephone Calls to:  
C. Bruce Hamburg  
(212) 986-2340

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full Name of Sole or First Inventor <b>Holger LAUSCH</b>	Inventor's Signature 	Date <b>5-02-2002</b>
Residence <b>Jena</b>		Citizenship <b>German</b>
Post Office Address <b>Semmelweisstrasse 31, D-07743 Jena</b>		<b>Germany</b>

Full Name of Second Joint Inventor, if any	Inventor's Signature	Date
Residence		Citizenship
Post Office Address		